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The development of logically sophisticated analytical models in a growing number of fields has placed new emphasis on efficiency in school management. Recent systems models guiding the longrun analysis of school management in terms of efficiency--through cost-benefit studies, systems analysis, and program planning and budgeting systems--are in sharp contrast to the traditional, conservative, shortrun process of school budgeting and accounting designed primarily to safeguard public monies. Cost-benefit analysis offers a systematic method by which benefit maximizing and cost minimizing choices can be made for a particular system and set of objectives. Systems analysis encompasses cost-benefit analysis within its larger framework and allows the choice of alternative purposes for the system under study as well as choices among alternative materials, personnel, and management procedures. Program planning and budgeting systems are the most innovative, comprehensive, and change-inducing of these approaches. They focus attention on the choice of (1) objectives to be achieved, (2) the system by which to achieve these objectives, and (3) the plan which will accomplish the objectives at the lowest cost. Application of these models, which is imperfect at present, has the advantage of requiring a careful and disciplined analysis of school management problems. (TT)

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# THE IMPENDING REVOLUTION IN SCHOOL BUSINESS MANAGEMENT<sup>1</sup>

by

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It is difficult in these times to recognize how unstructured the planning for school expenditures was early in this century. Few schools made any serious attempt to forecast or budget for expenditures and what planning was done was sporadic, inconsequential, and lacking in uniformity among schools.

Two events in 1911 began the movement toward more uniformity and specificity in school budgeting and accounting. The first was an effort by the U. S. Office of Education, one of a long series of efforts recurring each decade since, to standardize accounting for schools. The other was the publication of the work by Frederick W. Taylor, The Principles of Scientific Management, which stressed the need to find the best way to work and placed responsibility for this task on management. Subsequently,

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<sup>1</sup>The subject of this paper will be expanded and dealt with more fully in a forthcoming book, The New Cult of Efficiency and Education, by the author, to be published soon by the University of Pittsburgh Press. A useful book already available on this subject is Educational Planning-Programming-Budgeting: A Systems Approach, by Harry J. Hartley (Prentice-Hall).

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Henri Fayol in France gave further emphasis to the task of management as the chief executive's work. His efforts to develop a theory of administrative science has had powerful influences on improvement in management in all institutions. He emphasized the need for planning, organization, for command, cooperation, and control, and his prime criterion, like Taylor's, was efficiency.

A new emphasis on the efficiency criterion grew out of the Hoover Report on efficiency in government in 1946. Subsequently, development of techniques of operations research, general systems theory, and cybernetics stirred renewed interest in the criterion of efficiency. Perhaps the most influential publication of all in recent years was Charles J. Hitch and Roland N. McKean, The Economics of Defense in the Nuclear Age (Cambridge: Harvard University Press, 1961), which revealed the sophisticated approaches to efficiency undertaken for the U. S. Department of Defense. Since that time, renewed efforts have proliferated to analyze the operations of other social institutions in ways that permit the application of the criterion of efficiency.

Even more recently a newer priesthood of economists and political scientists has joined the engineers in advising government about improving schools, and schoolmen now have a new catechism to learn. Increasingly state and national lawmakers are asking economists and political scientists for new solutions to old problems in education; and as government makes the study of education both popular and profitable the number of researchers from these disciplines that are interested in education is increasing.

The models they use are, like those of the engineers, adapted from among those long used to describe physical, mathematical, and mechanical relationships. The direction of their inquiries, and their early conclusions, are changing our ideas about education, are also changing educational institutions, and perhaps their goals.

There appear to be four general models especially popular in these new inquiries into educational matters. These are (1) the investment model, which guides the analysis of educational expenditures as an investment that results in predictable returns to our economy; in this model man is the machine, schooling is the input, and the output is the product of work that can be aggregated into the gross national product; (2) the production model, in which the school is the machine, educational expenditures is an input and the output is a valuable consumer good (which is a traditional form of analysis, and the one most common to educators; or the output may be analyzed in terms of manpower needs and supply, again a traditional form); (3) the "motivation research" model which leads to the search for unexpressed needs in a clientele, the development of a product to satisfy the latent need, and a program for "engineering consensus" to arouse popular demand for the product; and (4) the system model which guides the analysis of the management of schools in terms of efficiency, through cost-benefit studies, systems analysis, and program planning and budgeting systems.

All four of these lines of inquiry, and their associated methods of analysis, are influential, because they are based on disciplined ways of understanding and because they communicate well to people accustomed to

similar logic in commerce and industry. Because of their power, they influence the way we restate the aims of education, and the means for achieving those aims.

Because of its interest to school management, I shall focus my remarks on the fourth set of interests of economists in education, the model of the mechanical system, the criterion of efficiency, the analytical methods of cost-benefit studies and systems analysis, and the dynamic and innovational possibilities of program planning and budgeting systems.

One can choose to dismiss this movement as a recurrence of the activities associated with the cult of efficiency that ran rampant in school affairs half a century ago, with the unhappy effects for education outlined so vividly by Raymond E. Callahan in Education and the Cult of Efficiency (Chicago: University of Chicago Press, 1962). Or one can conclude, as I suggested earlier, that since a new priesthood is in power in Washington, we have a new catechism to learn, and so dismiss it as ritual; indeed, I have seen evidence in recent conferences between federal and local officials that this is happening, for when an appropriate question is asked, the answer is interrupted if it is the appropriate answer.

However, I am inclined to think we cannot dismiss this movement lightly for three reasons: first, because this time it emerges with a much broader intellectual undergirding and logical sophistication; second, because politicians are seizing upon it as a means for controlling school costs that have risen steadily throughout this century at a rate faster than that of the total economy; and third, because it is a new manifestation of mechanistic models for thinking about human institutions



which has recurred with increasing vigor for many centuries. Therefore I will argue for knowing more about the movement, its assumptions, its methods, and its objectives.

A first step is to recognize that though the models are derived from the physical world, they grow in complexity and perhaps in sophistication through application to social phenomena. The simplest of the mechanistic models is the single-purpose engine designed to do one thing, such as raising water or transferring heat; cost-benefit analysis is the appropriate research tool; yet the attempt to apply the simplest model to social institutions, even those presumed to have single purposes, such as food service or transportation, introduces endless elaborations. Analogies from models of more complex machines are now being made to more complex social institutions, such as schools, and systems analysis is proposed as the appropriate research tool. Program planning and budgeting systems is a dynamic and hopefully predictive model; it is the most complex, even in the physical world; where it leads in the analysis of social institutions is not yet clear.

#### Cost-Benefit Studies

Schoolmen are already engaged in many places with some level of cost-benefit analyses on some parts of the total school operation. Such analyses are a familiar part of normal operation in many school systems, more recently in negotiating for new federal program funds (though not, I might add, without full evidence of the meeting of the minds usually required in contract negotiations!), but in the past, too, some fairly

sophisticated cost-benefit studies were done, in such areas as transportation and food services, though often with a too narrow frame of reference and with haphazard methodology.

The purpose of cost-benefit analysis is to find a way to give the highest net value to benefits after all costs are deducted. This, I suppose, is an economist's statement of the first law of thermodynamics, or perhaps is equivalent to a scientific restatement of the Golden Rule. That it is so fundamental emphasizes our imminent danger of being saddled with a new priesthood. Usually, in application of this purpose to schools, there are constraints on achieving either highest benefits or lowest costs, such as differences of opinion about the aims of education and the purpose of life, or legally vested interests of employees and privileged classes of patrons or clientele, or disadvantages to individuals that cannot be allocated on political or humanitarian grounds. The rules of the game require that such constraints be specified, and their effects measured as accurately as possible in the process. The analysis ideally is long-range, longer than for an annual budget period, so that costs and benefits can both be estimated in their broadest possible effects and converted to annual costs. For instance, it would be necessary, in studying cost-benefit effects of a school transportation system, to consider the alternatives of building smaller and more decentralized schools giving due regard to higher operating costs and amortization of capital and interest costs, against the economies of building fewer and larger attendance centers and thereby increasing transport costs; or to take another instance, comparing the costs and benefits (broadly defined) of

transporting children of widely dispersed families living on public welfare against such an alternative as assuming the costs of having the families moved closer to the school. Higher order concerns may bring in the issues of racial, social, or economic integration. Similarly a cost-benefit survey of food services would balance the advantages of a single food-capsule, against costs of traditional programs, taking into account also such constraints as food traditions, preferences, and taboos of the pupils to be served, and their attendant effects on costs and benefits.

A common difficulty with past efforts to apply cost-benefit analysis in education is that school officials let apprehensions about the constraints prevent thorough analysis; they find it easier to suffer discomforts arising from standard operating procedures than to face the unforeseen dislocations almost sure to follow changing them. Furthermore, any attempt to use this analytical approach will require a much more enlightened and explicit recognition of the function of the school in our society as a custodial institution, a function that is now little discussed and only poorly understood by public and professionals alike. Thus some will argue that analysis must be done by outside agencies, such as consulting firms or university consultants. Others insist that schools not only can, but must find or train staff who can analyze operations internally, as a routine part of the administrative process. Either approach is likely to be hindered by almost overwhelming pressures from both school boards and school staff to avoid controversial proposals, and any proposal for change is usually controversial.



By noting the constraints often imposed by conservative school officials I do not mean to minimize the constraints placed on cost-benefit analysis by the present state of the art, for admittedly it is in a primitive state. We keep it primitive by resisting any efforts at planning ahead that go beyond short extrapolations from historical trends, and by concealing our implied assumptions, such as that schools shall take over more of the custodial functions historically accepted by the family.

Critics quite rightly point out that the new techniques show no better promise for controlling the dark uncertainties that lie in our future than witchcraft, or even, perhaps, prayer. On the other hand, more careful and disciplined analysis of the state of our affairs can surely alert us more quickly to significant events as they occur, and allow us to adjust our plans more promptly to take uncertainties into account as the future unfolds them, and makes them certain. The logic of successive approximations in a climate of continuous concern is very persuasive. When the techniques are mysterious it is sensible to be suspicious about applying them, for to the extent that techniques are truly mysterious, they are probably not useful. On the other hand, most of the new techniques are understandable, can be learned by the reasonably capable man, and take social values as given. Many of the processes are only tedious, such as the calculation of interest rates at various levels in estimating one of many costs of a given course of action; yet bankers have come to know that such calculations are not mysterious, though they are very profitable. School officials can share in such profitable ventures by, for instance, calculating the costs of purchasing school sites ten years in advance of

their needs. Such calculations involve estimating the future rise in land values in order to estimate the cost of purchase ten years hence, and adding to the present cost the interest charges that would accrue over the ten-year period, the taxes that would be foregone over the same period, and estimating the fiscal capabilities of the district in the two points in time. This is not a mysterious process, but is in fact a very straightforward, quite unsophisticated, and perhaps over-simplified example of cost-benefit analysis which nevertheless recently saved a California school district more than a million dollars. If we cultivate the habit of identifying alternative courses of action, exploring their probable consequences systematically, I am sure we can devise increasingly useful applications. I emphasize again, however, the need for long-range planning. We have become quite sophisticated in building mechanistic models to estimate the productivity of investment in urban development, for instance, but rarely have we extrapolated them to their inevitable ends of obsolescence and demolition. Had we done so they might have alerted us to the effects of spiraling down to urban decay not attended to in the early enthusiasms of development.

The difficulties involved in attempting to quantify all dimensions of educational matters should not be allowed to obscure the benefits of trying to use these analytical aids, for even when imperfectly used they cause officials and citizens to look at problems in a systematic way. In this sense there is at least guidance toward asking the right questions.

The cost-benefit study is, as I have said before, the simplest and most essential of the analytical methods leading to the more complex

systems analysis and the enormous complexities of program planning and budgeting systems. Before leaving this relatively simple tool of inquiry, I wish to emphasize again that its purpose is efficiency, to be achieved by the substitution of parts in a mechanical model, either of less expensive but equally acceptable goals or products, or by substituting less costly materials or personnel that can serve equally well to accomplish the purposes intended. Whether this simplistic model is readily adaptable to social institutions is perhaps one of the most significant questions of our time.

Systems analysis becomes enormously more complex because the analyst will usually deal with a much larger set of variables, because the scale of operations is usually greater, and because he may want to substitute not only a new set of materiel or personnel input, but may also arrive at an entirely new set of purposes for the system under study. For instance, a whole set of concerns about transporting, feeding, and housing school children becomes irrelevant if we devise ways of placing the necessities for pursuing an education in the home (though, admittedly, mothers might be expected to place some constraints on such a proposal!). Or, to take another instance, plans for efficient operation of state institutions for the care and education of handicapped children, no matter how well done, became irrelevant when states began to make payments to local districts, often tenfold the allotments being made for the normal child, to encourage decentralization of these programs; yet in spite of increases in state payments, state costs went down sharply because the costs of the custodial care of these children was shifted back to the family, a shift that

experience has shown to be both acceptable to the family, as well as beneficial to the social integration of the children. This is one of the best examples I know to illustrate why cost-benefit analysis is best undertaken in the larger context of systems analysis where alternative systems and substitute approaches may be considered.

The importance of imagination and creative thinking in systems analysis may give us reason to worry about how much talent we can find capable of making widespread use of the technique; yet here again much of the usefulness of the technique rests on the orderly and disciplined attention given to analyzing the situation surrounding a problem, finding ways to quantify as many of the relevant variables as possible, devising simplified models within which the variables can be manipulated, substituting as the imagination dictates and the capacity for calculation and procurement allows, in the materials, personnel, and even purposes to be achieved, to come to proposals for alternative courses of action and their consequences. The systems analyst must be free to ignore the purposes defined for the system, for his task may include an improvement in, or sharp redirection of purposes. To return again to the mechanistic model, we would have closed off a whole spectrum of experimentation if we had required our engineers to limit themselves to thinking about transportation by land and water, or even to propeller-driven crafts in the air. I am reminded also of the large volume of very bad educationist "literature" we built up through the first three decades of this century on how to design, use, and control study halls; life has been simpler for all concerned in those schools that simply abandoned them.

Let me turn now to the most complex and, to educators generally, the most disturbing of the new lines of inquiry in education, the program planning and budgeting system, so widely known by its initials, PPBS. This is the most complex adaptation of mechanical models to the analysis of social institutions, because of its dynamic and predictive purpose. I suppose the main reason PPBS has so upset school officials is that it changes their perception of the school as a stable, static organization with its solid objectives rooted in its history of past performance, their view of the future as an orderly and conservative projection by extrapolation into the future. By contrast, the rules of PPBS are intended to break with the past, and to force planners into a sometimes frightening future orientation, where objectives may change markedly, technology may be substituted for human effort, and existing institutional arrangements are almost certain to become irrelevant, have in fact in many instances already become in part irrelevant.

Program planning and budgeting systems (PPBS) has powerful support at the federal level, and increasingly at the state level as well. With the emphasis on PPBS approaches imbedded in the Elementary and Secondary Education Act of 1965, it cannot be ignored at either state or local levels. We may expect information produced through the PPBS to increase at all levels of government; and it is upon this kind of information that legislative decisions about schools will be made, which may very well change the aims of education, and the schools as well.

Perhaps the new approaches to budgeting and planning are best illuminated by contrasting their aims, their processes, and their effects



on organizations with those of older methods. Traditional school budgeting and accounting is prudential, designed to safeguard the public monies, and to make an historical and accountable record to show that money was spent as intended when voted. The process in traditional budgeting is incremental; the budget for each period starts from the base of the previous period, and attention focuses on the amounts of changes in the budget categories for the next period. This approach is essentially conservative, since the largest proportion of the budget, usually in excess of 90 percent, projects the school system into the new period much as it was in the previous period.

In contrast, program planning and budgeting systems is innovative; attention is focused on choosing from among many possible objectives those specific objectives to be achieved, and then choosing among alternate courses of action that plan which will accomplish the chosen objectives at the lowest possible cost, or accomplish some more optimum set of objectives at a specified cost. The process is comprehensive, in that it requires each budget to be built from a zero base, not from the previous base. The approach encourages change, because at least the possibility exists that an organization will be altered substantially each time a budget is made. It is no wonder that school officials find PPBS disturbing; given lifelong exposure to the conservative climate of the school, which is one of the most stable institutions in our society, they find it difficult to cope with the potential for change inherent in this new budget procedure.

One may ask, what are the practical steps that a given local school system might take to organize itself in ways that will speed the development of more sophisticated approaches to budget planning?

The first step, and one that is generalizable to other areas of the large district operation, is to make more explicit than schools generally do now the need for specialization of school personnel. The widespread practice of line promotion on a seniority basis has had a deadly effect on all school operations including business management of district affairs. The account clerk, or bookkeeper, or business teacher who learns the necessary routines and then progresses upward through various district ratings of accountant and business manager positions is not likely to emerge at age 60 as the ideal innovator for program planning and budgeting systems. I have examined much of the literature generated by professional meetings of school business officials in this decade, which indicate an increasing awareness of and indeed interest in the impending revolution in school management that the new techniques portend; furthermore, a national study of program budgeting reported at the 1967 meeting of the Association of School Business Officials of the United States and Canada stressed general agreement that these innovations would be an improvement over traditional budgeting procedures, techniques, and formats, and that they would require "more as well as highly trained personnel and an increased need for electronic data processing." They also recognized the probability that these innovations would tend to further centralize many educational decisions at state and national levels, and that a "genuine possibility exists that the work being done by experts in accounting, data processing, and systems analysis may lead to the development of a program budgeting system for public education, including educational program structure and measurements of program effectiveness,

without the leadership and active participation of outstanding leaders in the educational profession."<sup>2</sup> The surprising thing was that though they expressed concern, the principal proposal was for cooperation in development of a uniform state plan for a uniform system of program budgeting (which is a conflict in terms!) and in the process "caution should be exercised not to proceed too rapidly".

The business managers are probably correct in their expectation that experts in accounting, data processing, and systems analysis will develop PPBS without the leadership of what they call "educational leaders," because in this instance these leaders are indeed not proceeding too rapidly. If we assume this prediction is correct, then we might prepare ourselves for living with the new circumstances by preparing an appropriate administrative structure to house the new capabilities.

A second practical step is to recognize a fundamental separation of business management and accounting functions from forward planning of programs and budget systems. This can be accomplished organizationally by creating an administrative unit reporting directly to the superintendent in a line separated from both business administration and administration of instruction, with all of the research, data processing, and operations analysis capabilities of the district included in it.

Let the budget unit be charged with defining and redefining viable subsystems within the district and with prescribing the forms in which

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<sup>2</sup>Quotations are from Proceedings of the Association of School Business Officials of the United States and Canada, the Association, Evanston, Illinois, 1967.

accounts are kept in the business and accounting unit so that information is organized in ways best suited to pursuing analysis of the operations. Let it be charged with preparation of both short- and long-range plans for alternative ways for managing their subsystems, with the alternatives always including contracting with other agencies or corporations for services. Specifications for staffing the budget and planning unit should be carefully drawn not to provide positions for existing personnel, for they will doubtless continue to be needed in their present positions, but to attract the best possible talent in analysts, cost accountants, and broadly oriented and well-prepared administrators with expertise and experience in both instructional and fiscal management. Let the board and superintendent face the fact that this unit would contain some of the most expensive talent employed by the district, but that its cost might be comparable in the short run with that of employing a firm of management consultants for a general survey, and that in the long run the cost-benefit ratio probably would favor establishing the permanent district unit. The kind of talent needed for such a unit is now being developed in many places, including university programs; we are, for instance, launching at Stanford this year a joint program involving the Schools of Education and Business to prepare a few carefully selected individuals each year through a coordinated program leading to the Master's in Business Administration and the Doctor of Education degrees, who will be well qualified to support or direct budget planning units in large school systems.

If business officials now in place can see no other advantage to such a unit as I propose, they at least should recognize that it would

provide them with a place to shift any blame that now falls on them for shortcomings in school operations, and so allow them to serve out their careers in relative peace.

PPBS is probably not a panacea for all the ailments of the school. On the other hand, I think it would be unwise to dismiss it either as a passing fad, or as a simple tool of management. It offers a systematic method for increasing knowledge about the structures, functions, and objectives of government services, including schools. That knowledge in turn can increase the understanding of policy-makers, and thereby increase their effectiveness in decision-making. It should improve administration and planning for the future especially in the larger units of local and state systems of education. For educators at the local level to continue to pay little attention to redirecting their purposes and planning, will simply eliminate them from consequential decisions, if present trends toward centralization and purposive redirection of educational institutions continue. A disciplined way to understanding is a source of very great power in democracy, perhaps the only one we should trust in the long run. We seem to be building a disciplined way of understanding around PPBS, and if educators want to be involved in the important policy discussions, they will need to learn the language in which much of these discussions are now conducted.

On the other hand I argue also for humanists to build an informed case against the mechanistic model for analysis of social institutions. We are, after all, attempting to recreate our social world, and especially our schools, to fit a model of our invention. We reason that since we



have created complex machines, we can now use laws we have derived from that experience to reconstruct our social institutions and make them conform to mechanical laws. In the effort we may violate two laws of logic: (1) we may apply our mechanical model to concerns too broad to encompass, in the instances where we fail to perceive the proper scope of the human condition; and (2) we may apply it to inconsequential ends when we attempt to analyze less encompassing statements of human aims.

The final argument for maintaining a wary dialogue between humanist and social planner is the failure of the mechanistic models to perform in a predictive sense when applied to human behavior in any way comparable to their capabilities in the physical world. One can argue that given full control of the minds of men to make them reason within the mechanistic model, this failure could be overcome, but the prospect of such control will add weight to the argument for the dialogue.

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